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Conference Abstract

Using Global Biodiversity Information Facility Occurrence Data for Automated Invasive Alien Species Risk Mapping

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Abstract

To support invasive alien species risk assessments, the Tracking Invasive Alien Species (TrIAS) project has developed an automated, open, workflow incorporating state-of-the-art species distribution modelling practices to create risk maps using the open source language R. It is based on Global Biodiversity Information Facility (GBIF) data and openly published environmental data layers characterizing climate and land cover. Our workflow requires only a species name and generates an ensemble of machine-learning algorithms (Random Forest, Boosted Regression Trees, K-Nearest Neighbors and AdaBoost) stacked together as a meta-model to produce the final risk map at 1 km^2 resolution (Fig. 1). Risk maps are generated automatically for standard Intergovernmental Panel on Climate Change (IPCC) greenhouse gas emission scenarios and are accompanied by maps illustrating the confidence of each individual prediction across space, thus enabling the intuitive visualization and understanding of how the confidence of the model varies across

space and scenario (Fig. 2). The effects of sampling bias are accounted for by providing options to:

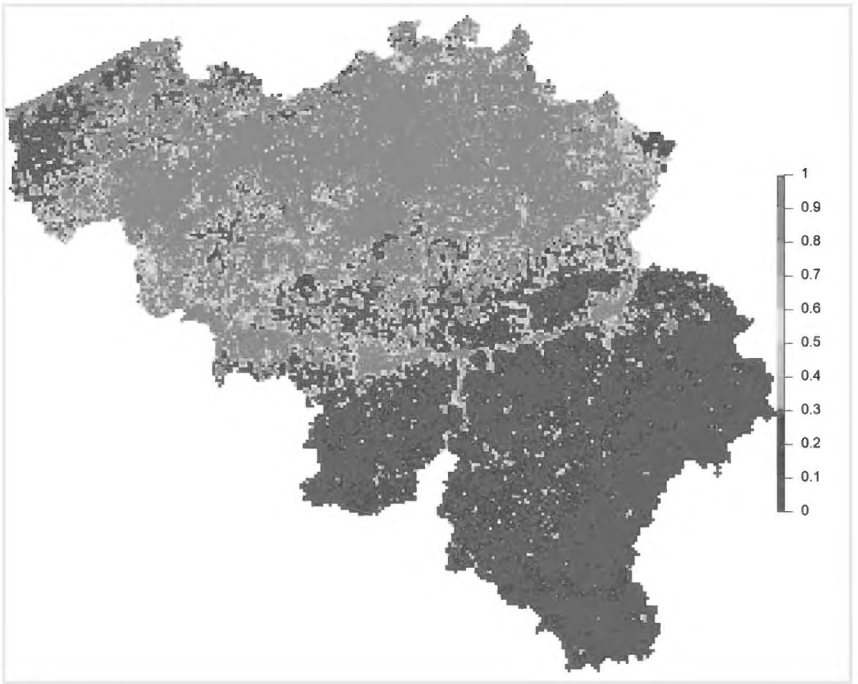

Figure 1.

Risk map for presence of *Cyperus eragrostis* in Belgium generated by the TrIAS modeling workflow. The map is scaled from 0-1, with 0 indicating the lowest risk and 1 indicating the highest risk.

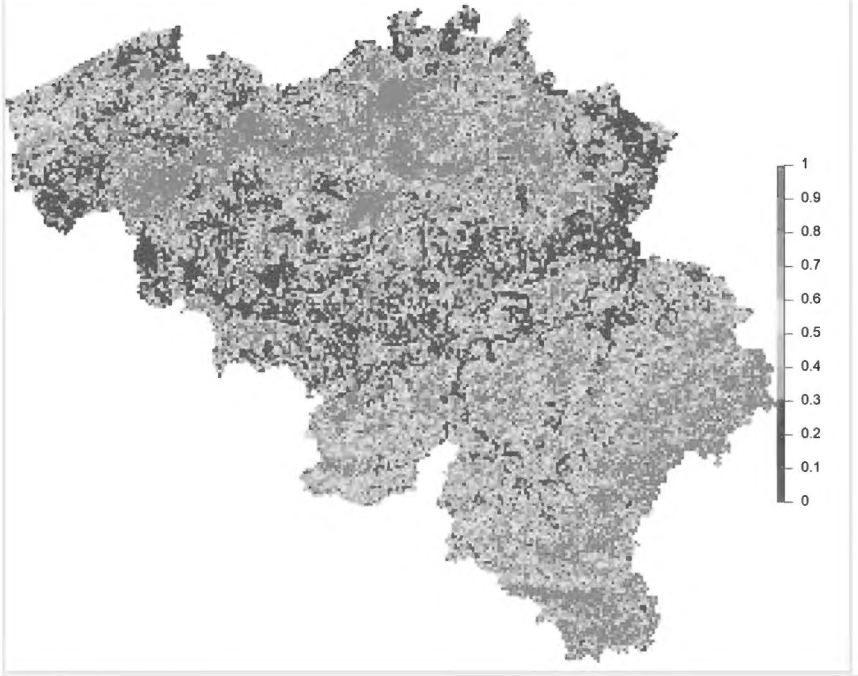

Figure 2.

Confidence of the predicted risk for *Cyperus eragrostis* generated by the TrIAS modeling workflow. Confidence is scaled from 0 (lowest confidence) to 1 (highest confidence).

1. use the sampling effort of the higher taxon the modelled species belongs to (e.g., vascular plants), and
2. to thin species occurrences.

The risk maps generated by our workflow are defensible and repeatable and provide forecasts of alien species distributions under further climate change scenarios. They can be used to support risk assessments and guide surveillance efforts on alien species in Europe. The detailied modeling framework and code are available on GitHub: https://github.com/trias-project.

Keywords

species distribution models, automated workflow, risk assessment, machine learning, sampling bias

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